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GAS ABSTRACTS

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1. GAS INDUSTRY

Canadian Gas Export

Enright, R. J. GAS "SWAP" PROPOSED. *Oil Gas J.* 50, 72-73 (1952) February 11.

A gas "swap" is suggested by Pacific Northwest Pipeline Corp. in which gas from Alberta would be supplied to the U.S. Northwest while gas would be supplied from Panhandle Eastern to Windsor for use in eastern Canada.

J. D. Parent

CANADIAN NATURAL GAS EXPORT PERMITS NOW EXPECTED SOON. *Pipe Line News* 24, 19-21 (1952) February.

Having been assured of an export reserve of 4.5 to 7.5 trillion cubic feet in excess of the estimated provincial domestic requirements for the next 30 years, it is expected that the Alberta Petroleum and Natural Gas Conservation Board will soon announce a decision to release gas for the Northwest, possibly on a reciprocal basis which would allow eastern Canada to get gas from the U.S.

J. D. Parent

Fire Safety

NFPA Committee. FIRE GAS RESEARCH REPORT. *Nat. Fire Protection Assoc. Quarterly* 45, 281-306 (1952) January.

This report discusses in detail the relative importance of heat and toxicity of fire gases in causing damage to the human body. In summary, the principle causes of fire deaths are as follows (not necessarily in order of frequency): 1. Carbon monoxide; 2. Insufficient oxygen (anoxemia); 3. Carbon dioxide and combined effect of CO and CO_2; 4. Effect of heat alone; 5. Surgical shock; 6. Bronchial and pulmonary edema (accumulation of fluid) due to acids, aldehydes, etc.; 7. Other toxic gases (HCN, halides, nitrogen oxides); 8. Ventricular fibrillation (failure of rhythm in heart beat) due to hydrocarbon vapors. Emergency treatment of fire victims is also briefly discussed.

C. A. Hall

Risinger, J. L. CONTROL AND EXTINGUISHMENT OF OIL TANK FIRES BY AGITATION. *Petroleum Refiner* 31, 77-82 (1952) January; *Petroleum Processing* 7, 54-55 (1952) January; *Petroleum Engr.* 24, A55-A70 (1952) February; *Pipe Line News* 24, 50 (1952) January.

A method for control of crude oil fires and other petroleum fires where the hydrocarbon has a flash point above normal atmospheric temperatures is discussed. The theory of control is that by agitation of the petroleum supply feeding the blaze, cool oil is brought to the surface and the vaporization is much slower thus reducing the vaporized fuel which feeds the fire. Recent large scale tests at the Olean refinery of Socony Vacuum have shown excellent results from this method. The turbulence has been achieved by bubbling large amounts of air through the storage tank draw-off or similar openings.

W. G. Bair

Gas Lines in 1951

FEDERAL POWER COMMISSION SUMMARIZES 1951 AUTHORIZATIONS OF GAS LINES. *Gas Age*, 109 (1952) March 13.

FPC figures for 1951 on authorization of gas lines is given. During the calendar year 6,091 miles of pipe line and 426,500 compressor horsepower costing $471,383,184 were authorized. The figures for the second half of the year are quite low, amounting to only 1,463 miles of line.

J. D. Parent

Gas Sales and Load

Wrench, H. K. FUEL FOR INDUSTRY. *Am. Gas Assoc. Monthly* 34, 17, 43 (1952) February.

The author presents a quite complete analysis of gas sales made by Minneapolis Gas Company. The manner of meeting peak load is included. Abstractor's note. To do justice to this concise story is impossible in a few sentences due to the number of data presented. Those interested will find reading of the entire article rewarding.

J. D. Parent

Gas Supply

GAS AVAILABILITY RISING. *Oil Gas J.* 50, 48 (1952) March 3.

The newly issued report of the National Petroleum Council on oil and gas availability indicates increasing gas availability. For example, about 10 billion cubic feet of natural gas may be available to the domestic consumer in 1955.

J. D. Parent

Heating Sales

ANOTHER GOOD GAS HEAT YEAR. HEATING SALES VOLUME THIRD BEST IN INDUSTRY'S HISTORY. *Gas Heat* 3, 21-26 (1952) March.

This is a survey of heating sales volume for 1951. D. L. Nicol

Safety

Armistead, G., Jr. SAFETY AND THE CHEMICAL ENGINEER. *Chem. Eng. Progress* 48, 5-10 (1952) January.

The article points out that safe practices are known but not applied. More general dissemination of industrial safety information with emphasis on passing this information along to every employee is recommended.

W. G. Bair

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention.

Tippy, W. B. RATES FOR LONG DISANCE PIPELINES. p. 72

White, B. C. EIGHT METHODS OF SUPPLYING AUXILIARY GAS IN OLD OR NEW NATURAL GAS SITUATIONS. p. 70

2. APPLIANCES

Automatic Ignition

Waters, H. SELF-IGNITION GAS BURNER. U.S. 2,586,278 (1952) February 19.

A novel method of automatic ignition for range top burners is described. By the use of a catalytic spiral element the gas-air mixture leaving the burner head is ignited.

D. L. Nicol

Heat Pump

Gay, F. W. METHOD AND MEANS FOR HOUSE HEATING. U.S. 2,584,573 (1952) February 5.

A method of house heating by use of a heat pump is proposed. The novel feature of this method is the use of a heat reservoir in the earth under the house. During moderate weather the heat pump takes heat from the outdoor air to heat the house and the heat reservoir under the house. When the outdoor air-temperature is too low for use as a heat source, the heat pump takes the heat stored in the earth.

D. L. Nicol

House Heating

Konzo, S., Green, G. H., Roose, R. W. and Childs, M. E. PERFORMANCE OF A GAS-FIRED FORCED-AIR HEATING SYSTEM IN RESEARCH RESIDENCE NO. 1. Univ. of Illinois Eng. Expt. Station Bull. No. 397 (1951) December.

The variables of blower speed, burner operation and resultant air temperature were investigated to determine the optimum operating conditions from the standpoint of both comfort produced and cost of operation. The heating system was forced-air heating. Conclusions state that satisfactory results were obtained with low air-flow rate and low fan-switch settings. No particular advantages were found for a two-speed blower, two-stage gas valve or two-stage thermostat. D. L. Nicol

Safety Pilot

Humphrey, R. P. (assigned to General Gas Light Co.) SAFETY GAS PILOT WITH DRAFT GUARD. U.S. 2,581,590 (1952) January 9.

This is a safety pilot, which is economical in construction, but strong and durable. It has a draft guard and pilot burner jet which focuses on the thermo-couple tip. Both features tend to reduce the chances of blowing out the pilot. B. C. Lang

3. COMBUSTION AND INDUSTRIAL FURNACES

Burner Design

Keller, J. D. DESIGN OF MANIFOLDS AND PIPE BURNERS. PART I. *Ind. Heating*, 19, 52-58, 140 (1952) January.

The two main factors which affect distribution of fluids from manifolds are inertia of the fluid and pipe-wall friction. Therefore when designing manifolds, it is important also to consider ratio of length of duct to inside diameter of duct. B. G. Lang

Keller, J. D. DESIGN OF MANIFOLDS AND PIPE BURNERS. PART II. *Ind. Heating*, 19, 218-224 (1952) February.

This is a discussion of manifold design where the cross-section area is varied along the length

so as to have the friction loss counter-balance the regain of pressure resulting from deceleration.

B. G. Lang

Gas Burner Draft

Field, E. A. REGULATING DRAFT ON LARGE GAS BURNERS IS A NECESSITY. *Gas Age* **109**, 21-24 (1952) January 31.

From a series of test it was concluded that large burners should be draft regulated. It was shown that higher CO_2 readings, higher efficiencies, fewer pilot extinguishments, and higher output for the boiler will result from this control.

B. G. Lang

Gas Electro-chemical Cell

Gorin, E. (assigned to Pittsburgh Consolidation Coal Co.) INTEGRATED GASIFICATION ELECTRO-CHEMICAL SYSTEM. U.S. 2,581,-650 and 2,581,651 (1952) January 8.

These patents claim the generation of 0.5 to 0.9 voltage current by a high temperature electrolytic cell comprising an iron-magnetite anode and iron-iron oxide cathode separated by a solid, high-melting glass electrolyte. Air entering the gas-tight anode compartment maintains the state of oxidation of the anode which loses oxide ions via the electrolyte to the cathode. Synthesis gas (CO and H_2) from a steam-carbon gasification chamber sweeps the cathode and reduces the higher oxide of iron formed by the ion migration, and is itself oxidized to H_2O and CO_2. With the gasification and electro-chemical zones at the same temperature and with direct heat recovery in the steam returned from the cell to the gasifier, the first patent claims a 60% overall efficiency of conversion of carbon to electricity. With the cell at a higher operating temperature and with more complete heat exchange, the second patent claims up to 80% overall efficiency.

O. P. Brysch

Laundry Equipment

Glarner, M. and Walter, L. GAS-HEATED LAUNDRY MACHINERY IN SWITZERLAND. *Ind. Gas* (British) **15**, 131-134 (1952) February.

Methods and uses of gas-fired equipment for commercial laundries are described.

D. L. Nicol

Nuclear Power Plant

Elliott, R. D. ECONOMICS OF STEAM-TEMPERATURE SELECTION IN NUCLEAR POWER PLANTS. *Nucleonics* **10**, 57-61 (1952) February.

An analysis is presented of the costs of electric power as produced at the power station in an effort to determine the optimum power-station steam temperatures in the design of power plants that use fissionable material as fuel. The cost analysis breaks down the cost into three components; fuel cost, operation cost, and investment cost. Each of these is studied separately, primarily as a function of top steam temperature in the plant; the results are then synthesized into a combined cost per unit of electric power. The most economical steam temperature turns out to be in the range 600° – 800° F., for installations where fuel is supplied at no expense to the power plant as would be the case where a nuclear reactor were used.

E. J. Pyrcioch

Radiant Tube Burners

Prévot, M. R. LE CHAUFFAGE DES FOURS INDUSTRIELS AU MOYEN DE TUBES RADIANTS PORTES A HAUTE TEMPERATURE. [HEATING OF INDUSTRIAL FURNACES BY HIGH TEMPERATURE RADIANT TUBES.] *J. usines gaz.* **76**, 12-20 (1952) January.

Combustion in radiant tubes of premixed gas and air, and of diffusion-flame or layer mixing combustion are compared. Pilot experiments on four sizes of steel tubes are described, with tabular and graphical data on heat transfer, temperatures and rates of input.

O. P. Brysch

Calorific-Value Control

Kenward, J. R. and Lucas, T. A. AUTOMATIC CONTROL OF CALORIFIC VALUE. *Gas Times* (British) **70**, 201-205 (1952) February 8.

Following a preliminary discussion of various types of controllers, the system employed for controlling the calorific value of a mixture of coal gas and diluent gas is described. Two types of calorimeters were used as measuring units.

B. E. Hunt

4. CARBONIZATION AND GASIFICATION

Ammonium Sulfate

Boulin, M. W. LES PROCEDES DE FABRICATION DU SULFATE D'AMMONIAQUE DANS LES COKERIES. [THE PROCESSES OF AMMONIUM SULFATE MANUFACTURE IN COKE OVEN PLANTS.] *J. usines gaz.* **76**, 4-5 (1952) January.

The recovery of ammonia as sulfate is briefly reviewed. The semidirect and indirect processes are discussed with relation to the fundamental mechanisms of condensation in gas works by using Holling's curve of solubilities and the corresponding liquor-gas concentration curves with and without recycling of liquor.

O. P. Brysch

Meissner, H. P., and Hyde, R. W. (assigned to Republic Steel Corp.) METHOD OF PREPARING SUBSTANTIALLY IRON-FREE AMMONIUM SULFATE FROM SPENT PICKLE LIQUOR. U.S. 2,584,280 (1952) February 5.

Spent pickle liquor is contacted with ammonia-containing coke-oven gas to elevate and maintain the pH between 8.1 and 8.5, to obtain a slurry of precipitated ferrous iron compounds. The solids are separated (by centrifuging), washed and sent to the sintering plant. The clear liquor is evaporated to crystallize out the ammonium sulfate. O. P. Brysch

Carbonizing Properties

Davis, J. D., Reynolds, D. A., Brewer, R. E., Naugle, B. W., Wolfson, D. E., Gibson, F. H., and Birge, G. W. CARBONIZING PROPERTIES: BRITISH COLUMBIA, MATANUSKA VALLEY (ALASKA), AND WASHINGTON COALS AND BLENDS OF SIX OF THEM WITH LOWER SUNNYSIDE (UTAH) COALS. U.S. Bureau of Mines, Bulletin 510 (1952).

Carbonizing properties are reported for 18 coals (2 from Alaska, 12 from British Columbia, 3 from Washington and 1 from Utah) using the BM-AGA standard 13-inch retort at 900° C. Gieseler and Davis plasticity, agglutination and free swelling indexes, expansion (sole-heated oven) as well as coal and product analyses are tabulated. Blends of these coals with the Utah, as well as with Pocahontas and Oklahoma low-volatile coals were also tested. The medium-volatile Elk River No. 9 and No. 10 (Crowsnest, B.C. area) could be substituted for Oklahoma coal in a blend with 82% Utah and 3% pitch. O. P. Brysch

Davis, J. D., Reynolds, D. A., Brewer, R. E., Wolfson, D. E., Naugle, B. W., Frederic, W. H., and Birge, G. W. CARBONIZING PROPERTIES: EASTERN KENTUCKY COALS FROM ELKHORN NO. 1, ELKHORN NO. 2, LEATHERWOOD, AND HARLAN BEDS. U.S. Bureau of Mines Bulletin 511 (1952).

Carbonizing properties of these 4 coals and their blends with 20- and 30% low-volatile Pocahontas coal are reported. The BM-AGA assay at 800° and 900° C, Gieseler and Davis plasticity, agglutinating and free-swelling index and expansion (sole-heated oven) are given. Comparative data, including product analyses, also include results on 2 blends tested in the 500-lb. slot oven. The four coals are somewhat similar in behavior and their blends are suitable for production of metallurgical coke.

O. P. Brysch

McKee, J. H. ASSESSMENT OF COALS FOR COKING. (Review Series No. 112) *British Coal Utilis. Res. Assoc. Monthly Bull.*, **16**, 41-51 (1952) February.

The types of test used to determine the suitability of a coal for coking and the quality of the coke produced are surveyed and discussed briefly. Desirable properties of coke for metallurgical use are considered by citing recent recommended limits of chemical and physical factors. Shortcomings of shatter and abrasion tests are reviewed. Plastic behavior of coals in the oven and in numerous pilot and laboratory tests is briefly discussed and limitations of the latter are indicated. Tests for dangerous coking coals and their application to coal selection in practice are reviewed in some detail.

O. P. Brysch

CO Removal

Deringer, H. (assigned to Sulzer Freres, S. A. Switzerland) METHOD AND ABSORPTION MEANS FOR SEPARATING AND FOR RE-

COVERING CARBON MONOXIDE FROM GAS MIXTURES. U.S. 2,580,527 (1952) January 1.

Carbon monoxide is separated from town gas by contacting the gas stream at normal manufacturing pressure with an aqueous solution of a cuprous salt containing some magnesium salt precipitate. The magnesium salt is effective for lowering the decomposing pressure of the cuprous carbon monoxide compounds. The advantages of the described method are the removal of a very large percentage of carbon monoxide at a low cost, at the pressure conditions prevailing in coal gas manufacture.

C. E. Hummel

Teter, J. W. (assigned to Sinclair Refining Company) SEPARATION OF CARBON MONOXIDE FROM GASEOUS MIXTURES. U.S. 2,583,239 (1952) January 22.

A process is claimed of separating carbon monoxide from gaseous mixtures by contacting with a selective absorbent for carbon monoxide comprising a reduced metal supported on a porous carrier. The metal is pretreated with a small amount of sulfur or sulfur compound to reduce the capacity to absorb hydrogen.

H. A. Dirksen

CO_2 Recovery

Van Nuys, C. C. (assigned to Air Reduction Co.) RECOVERY OF CARBON DIOXIDE. U.S. 2,585,288 (1952) February 12.

A process for recovering carbon dioxide from industrial waste gases is developed. The gases are compressed, cooled and then expanded to obtain liquid carbon dioxide. Solid carbon dioxide could be obtained by expanding liquid carbon dioxide.

D. C. Gami

Coal Structure

Maggs, F.A.P., Dryden, I.G.C., Nagelschmidt, G. and Cartwright, J. ACCESSIBLE SURFACE AREAS OF COALS. *Nature* (British) 169, 269-271 (1952) February 16.

The three letters grouped under the above title present a defense of the BCURA theory of coal structure and the method of determination of accessible surface areas of coals by the heat of wetting method. Differences in the areas found by the BET method and those by the heat of wetting method are discussed. The possible effects of polar solvents and of pore constriction at liquid air temperatures are treated, and electron microscope views of coal-extract "particles" are presented.

O. P. Brysch

Orchin, M., Golumbic, C., Anderson, J. E., and Storch, H. H. STUDIES OF THE EXTRACTION AND COKING OF COAL AND THEIR SIGNIFICANCE IN RELATION TO ITS STRUCTURE. U.S. Bureau of Mines Bull. 505 (1951).

Coal behavior is studied with respect to (1) dispersion by solvents and (2) destruction and regeneration of the coking properties. Certain polycyclic compounds extracted 95% of the organic material of bituminous (Bruceton, Pittsburgh Bed) coal at atmospheric pressure and high temperature. Of this extract, the 20% which was soluble in benzene contained the "coking principle." Chemical, spectroscopic and x-ray studies permitted some conclusions concerning the nature of this fraction. Catalytic hydrogenation converted a noncoking sub-bituminous coal to good coking coal, and also restored to bituminous coal the coking properties lost by air oxidation. The extraction and carbonization behavior of coal conforms with the proposed colloidal theories of structure. These comprise micellar matrices in a dispersion medium, or humin constituents mixed with bitumens, the two components differing in molecular size, aromaticity, O_2 content and extent of cross linking. Results of Gillet's oleic acid reactions, hydrogenation, and oxidation are given for several American coals.

O. P. Brysch

Coke Plant Effluents

Nellist, G. R. COMPOSITION AND TREATMENT OF WASHERY AND COKE WORKS EFFLUENTS. *Gas World* (British) 135, Coking Sect. 7-12, 13 (1952) January 5.

Effects and causes of pollution are discussed generally in an introduction, followed by reviews of toxicity of various compounds commonly occurring in coke plant effluents and their effect upon "oxygen absorbed" and "B.O.D." determinations. Coal washery effluents and modern methods of improving them are

treated briefly. Ammonia liquors of semi-direct and indirect processes, benzol waters, phenol and tar acids (and their extraction), cyanides, final cooler and coke quenching water are discussed separately, and modern practice in treatment, filtration and disposal are mentioned, with citation of 20 references.

O. P. Brysch

Coking Coal Reserves

Dowd, J. J., Toenges, A. L., Abernethy, R. F. and Reynolds, D. A. ESTIMATE OF KNOWN RECOVERABLE RESERVES OF COKING COAL IN JEFFERSON COUNTY, PA. U.S. Bureau of Mines Report of Investigations 4840 (1952) January.

Statistics are reported on the known, and recoverable reserves of coking coal in Jefferson County, Pa., as of January 1, 1950. The coals are high-volatile A bituminous rank, and although not much used at present, could be blended with higher rank coals for coke manufacture. The Lower Freeport and Lower Kittanning beds are most important, followed by the Upper Freeport, Brookville, Middle Kittanning, Clarion, Upper Kittanning and Mahoning.

O. P. Brysch

Coking Developments

Jones, W. I. RECENT RESEARCHES ON AND DEVELOPMENTS IN THE CARBONIZATION OF COAL. *Gas World* (British) 135, (*Coking Section*) 15-18 (1952) February 2.

Worldwide research activity in coal carbonization is reviewed with relation to the several major trends: (1) improvements in existing plant and process (2) blending of coals (3) pretreatment of poorly coking coals by preoxidation and preheating (4) selective separation of petrographic constituents (5) development of new carbonizing processes to permit use of non-coking coals. British work on blending of borderline coals, blending of pitch, briquet carbonization and use of low and medium temperature carbonizing processes for making domestic and metallurgical cokes is mentioned.

O. P. Brysch

Nelson, K. J. (assigned to Standard Oil Dev. Co.) FLUIDIZED CARBONIZATION PROCESS. U.S. 2,582,711 (1952) January 15.

Processing by fluidization of coals which tend to agglomerate or show plasticity is carried out by charging the fluidized raw coal to a central zone where it is mixed with an excess of already processed coal from a surrounding annular zone, and the particle mixture here is moved upward rapidly by air injection and is heated through its plastic range by combustion of volatiles.

O. P. Brysch

H_2S Removal

Saunders, J. J. THE COMPOSITION AND ACTIVITY OF MANCHESTER PROCESS PLANT LIQUOR. *Gas World* (British) 135, 200-201 (1952) February 23.

A description is given of the Manchester liquid purification process for H_2S removal. Alkaline ferric oxide suspension is used as the absorbent in six countercurrent scrubbers through which the gas passes in series. Iron sulfide in the spent absorbent is oxidized by air and recycled. The presence of hydrogen cyanide in the gas stream causes the formation of complex cyanides which greatly increases H_2S-removal efficiency. Control tests carried out on the absorbent are described.

C. E. Hummel

Methane Reforming

Bellini, di G. CONDIZIONI TEORICHE CHE EVITANO LA FORMAZIONE DI NEROFUMA NEL REFORMING DEL METANO. (THEORETICAL CONDITIONS FOR AVOIDING THE FORMATION OF CARBON BLACK DURING THE REFORMING OF METHANE. *Rivista dei Combustibili* (Italian) 5, 694-700 (1951) December.

The reactions which can happen in the reforming of methane are considered, and their equilibrium constants at different temperatures are determined. Through equilibrium constants and conditions of temperature and pressure (supposing all carbon of starting methane to be in the gaseous form at the end of the reaction) minimum steam/methane ratio for avoiding carbon black formation is calculated.

Author's Abstract

Stand-by Gas Supply

White, B. C. EIGHT METHODS OF SUPPLYING AUXILIARY GAS IN OLD OR

NEW NATURAL GAS SITUATIONS. *Gas Age* **109**, 31-34, 90, 92 (1952) February 14.

The engineering and economics of peak shaving and stand-by plants for converting from water gas to light oil gasification, water gas to heavy oil gasification, use of propane-air plants, catalytic reforming of liquid hydrocarbons, underground storage in caverns or high-pressure tanks, and liquefaction of natural gas are discussed. B. G. Lang

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Kenward, J. R. AUTOMATIC CONTROL OF CALORIFIC VALUES. p. 67

Kohl, A. L. ECONOMICS OF SULFUR PRODUCTION FROM HYDROGEN SULFIDE. p. 82

Pigford, R. L. ABSORPTION AND HUMIDIFICATION. p. 81

5. NATURAL GAS AND NATURAL GAS CONDENSATES

Automatic Pipeline Stations

Chilton, H. T., Jr. APPLICATION OF PIPE-LINE CONTROLS TO FIELD OPERATIONS. *Oil Gas J.* **43**, 85-89 (1952) March 3.

The application of pipe-line controls to pumping stations will result in more economical operation in that these stations need not be continuously manned. The operating sequence for a system involving an originating station and a relay station is discussed in detail. In addition to the automatic programming controllers, the standard emergency controls are installed. B. E. Hunt

Carbon Black

Kilpatrick, M. O. (assigned to Phillips Petroleum Co.) RECOVERY OF CARBON BLACK FROM SUSPENSION IN A GAS. U.S. 2,585,659 (1952) February 12.

Recovery of carbon black from suspensions in "furnace" gas is claimed, the method comprising the contacting of the cooled suspension with a hot aqueous medium containing a wetting agent to form a water slurry of above 10% black content. This slurry, withdrawn from the scrubbing device, is split, and part is recirculated as scrubbing medium and part is pumped to the copolymerizing plant where it can be directly incorporated in synthetic rubber latex. A dilute latex also may be used for scrubbing. O. P. Brysch

Deep Wells

NEW DEEP PRODUCER? *Oil Gas J.* **50**, 56 (1952) March 3.

Magnolia is preparing to test gas shows in Louisiana in a well 18,660 ft. deep. A new mud formula was required to permit drilling the last 300 feet of hole as temperatures as high as 325° and other factors caused gelation of all available muds. J. D. Parent

Distribution Design

SYSTEM DESIGN AND OPERATION. *Am. Gas J.* **176**, 27 (1952) February.

The design and operation of distribution systems are discussed in a qualitative manner. Mention is made of type of system, construction, service lines, holder storage, operation, and pipe. B. E. Hunt

Dust Removal Practise

Dennis, R., Johnson, G. A., First, M. W. and Silverman, L. HOW DUST COLLECTORS PERFORM. *Chem. Eng.* **59**, 196-198 (1952) February.

The performance of a number of commercial dust collectors was evaluated in the field. Data listed for each unit includes a description of the dust in terms of type, size and air loading, the air-flow rate and velocity, and the efficiency of dust collection. D. V. Kniebes

Gas Odorization

Lauderbaugh, A. B. ODORIZATION OF NATURAL GAS. *Am. Gas Assoc. Monthly* **34**, 18, 19, 42 (1952) February.

A summary is given of the problems associated with the odorization of natural gas. Desirable odorant characteristics and difficulties encountered with various types of odorizers are described. C. E. Hummel

LP-Gas Recovery

Anderson, R. H. and Colburn, W. E. SELECTING THE OPTIMUM LIQUID RECOVERY PROCESS. *Gas* 28, 112, 115, 118-120 (1952) February.

Four processes—adsorption, condensation, gas fractionation and absorption—are discussed. Methods for selecting optimum cycle are outlined and illustrated by an example.

D. C. Gami

LP-Gas Weed Burning

BURNING WEEDS IS IMPORTANT APPLICATION. *Butane-Propane News* 14, 98, 100 (1952) January.

After-burning with L.P. burners has been now reduced to a minimum. These weed burners are mounted on railroad cars or on trucks. Three men can cover 6 miles of highway per day with this highly mobile flame weeder.

B. G. Lang

Natural Gasoline

McChesney, J. R. FOUR-HORIZON DOLLARHIDE'S CASING-HEAD GAS PROCESSED IN NEW GASOLINE PLANT. *Oil Gas J.* 50, 123-128, 131 (1952) February 11.

The conventional compression-absorption type gasoline plant is constructed at the Dollarhide Field. The plant with 80 MMcf/day compressor capacity will be operated by Pure Oil Co.

D. C. Gami

Nitrogen Separation

Cost, J. L. (assigned to Elliott Co.) SEPARATION OF NATURAL GAS MIXTURES. U.S. 2,583,090 (1952) January 22.

This invention relates to the separation of nitrogen from natural gases high in nitrogen content by liquefaction and rectification of the gas at low temperatures. The natural gas is compressed to about 3000 psia. and partially liquefied in the reboiler of the distillation column. It is then completely liquefied by a cold nitrogen stream and subsequently introduced by throttling to 130 psia into the distillation column. The separated nitrogen from the top of the column is cooled and partially liquefied and so provides the reflux necessary for high purity of the methane. The unliquefied nitrogen provides the low-temperature refrigeration necessary for such partial liquefaction. This refrigeration is made available by expanding the nitrogen in several stages to atmospheric pressure.

O. T. Bloomer

Oil Black

Resen, F. L. NEW CARBON-BLACK PLANT COMPLETES SHAKEDOWN RUN. *Oil Gas J.* 50, 114, 116 (1952) February 18.

Continental Oil Black Co.'s new $2,000,000 carbon black plant at Lake Charles, La. is now in production. 500 bbls of oil are cracked per day, the heat of reaction being furnished by direct mixing with the products of combustion of natural gas and air.

J. D. Parent

Pipeline Cleaning

Ade, C. W. HOW MISSISSIPPI RIVER FUEL TESTS FLOW EFFICIENCY IN THE CLEANING PROGRAM. *Gas* 28, 95-100 (1952) March.

The efficiency before and after pigging was tested for sections of pipe line at least 8 to 10 miles long. Flow rate was determined by use of ammonia as a tracer. Test details are given, but test results are not.

J. D. Parent

Pipeline Rates

Tippy, W. B. RATES FOR LONG DISTANCE PIPELINES. *Gas* 28, 39-43 (1952) February.

Difficulties experienced by distribution companies due to regulation are discussed. Problems include (1) local utilities are expected to supply the gas demanded although a proper balance between costs of gas and competing fuels is not maintained; (2) insufficient incentive to transmission lines to provide greater supplies; (3) relatively rapid adjustment of rates by FPC to transmission lines and slow adjustment of rates of distribution companies.

J. D. Parent

Service Safety-Vent

Dustin, J. E. SAFETY FIXTURE FOR GAS SERVICE PIPES. U.S. 2,584,439 (1952) February 5.

A device is shown that prevents the leakage of gas along the service line entering the customer's premises. The device provides a sleeve around the gas service line with a vent to the atmosphere.

D. L. Nicol

Submarine Pipeline

Love, F. H. LONGEST, LARGEST LINE LAID IN GALVESTON BAY. *Petroleum Eng.* **24**, D3-D6 (1952) February.

Although there are a number of oil and gas lines beneath Galveston Bay, the new 18-inch gas line of Pan American Gas Co. is the longest (10 miles) and of greatest diameter. Operating pressure is 850 psi maximum. Pipe walls are ½-inch thick and are coated with 1¼ inches of concrete or barytes. River weights are used in the ship channel. A valve controlled 15 miles from the source can be used to cut off the gas supply in case of line failure.

J. D. Parent

Sterrett, E. HIGH PRESSURE SUBMARINE LINE BRINGS GAS TO SHORE. *Pipe Line News* **24**, 25-28 (1952) February.

Description of the construction of a 20" submarine line connecting a field 15 miles out in the Gulf of Mexico and Pure Oil Company's shore facilities is given. This sets a new record for size of "sea-going" pipelines.

D. C. Gami

Well Cleaning

Hall, E. B., Snyder, E. F., and Seybold, C. S., Jr. METHOD AND COMPOSITION FOR TREATING WELLS. U.S. 2,580,765 (1952) January 1.

This invention proposes the use of an aqueous solution containing disodium pyrophosphate or sodium acid pyrophosphate ($Na_2H_2P_2O_7$) with an anionic and a nonionic detergent for the removal of all types of drilling fluid material deposited on the walls of the well. The combination of anionic and nonionic detergents restrains the precipitation of calcium compounds from the connate water of wells.

D. C. Gami

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Sage, B. H. VOLUMETRIC BEHAVIOR OF CONDENSATE AND GAS FROM A LOUISIANA FIELD. p. 77

PLASTIC TUBING FOUND CONVENIENT FOR SERVICE PIPING REPLACEMENTS. p. 84

6. PETROLEUM AND SYNTHETIC LIQUID FUELS

Catalyst Preparation

Schexnailder, R. E., Jr. (assigned to Standard Oil Development Co.) PREPARATION OF SILICA-ALUMINA BEAD CATALYST. U.S. 2,582,722 (1952) January 15.

A method of preparing a synthetic silica-alumina gel catalyst by reacting solutions of sodium aluminate and sodium silicate to form a hydrosol, and dispersing the hydrosol as fine droplets in a water-immiscible liquid, by controling the pH of the immiscible liquid and the pH of the wash water with acetic acid. A catalyst suitable for converting hydrocarbons is claimed.

W. J. Pleticka

Desulfurizing Catalyst

Berg, C. UNION'S COBALT MOLYBDATE PROCESS FOR REFINING HIGH SULFUR STOCKS. *Petroleum Processing* **7**, 186-189 (1952) February.

The cobalt molybdate process employs catalytic treatment in the presence of a recycle hydrogen stream for the production of premium fuels from high sulfur crudes as well as stocks derived from shale and oil sand. The high activity of the catalyst effects virtually complete elimination of sulfur, nitrogen and oxygen from the charge stock.

W. J. Pleticka

Fischer-Tropsch Synthesis

Anderson, R. B., Seligman, B., Schultz, J. F., Kelly, R., and Elliott, M. A. FISCHER-TROPSCH SYNTHESIS. SOME IMPORTANT VARIABLES OF THE SYNTHESIS ON IRON CATALYSTS. *Ind. Eng. Chem.*, **43**, 391-397 (1952) February.

The article discusses some variables of the Fischer-Tropsch synthesis on iron catalysts using a 50-50 hydrogen-carbon monoxide mixture: namely, pressure, particle size, and alkali content of catalyst on activity and selectivity. Also presented is a method of expressing catalytic activity.

H. A. Dirksen

Atwell, H. V. (assigned to The Texas Company) CATALYTIC SYNTHESIS OF HY-

DROCARBONS. U.S. 2,583,134 (1952) January 22.

A method is described of converting a hydrocarbon feed to desirable hydrocarbon fractions, by reacting in a first stage with a reducible metal oxide to form carbon monoxide and hydrogen and a reduced metal oxide. In a second stage, carbon monoxide, hydrogen and reduced metal oxide is continuously passed through a hydrocarbon synthesis catalyst to form desired hydrocarbon fractions and a reoxidized metal oxide. H. A. Dirksen

Clark, A. (assigned to Phillips Petroleum Co.) HYDROCARBON SYNTHESIS CATALYST. U.S. 2,583,254 (1952) January 22.

The patent claims a catalyst and process for the hydrogenation of carbon monoxide. The method limits formation of free carbon and high-weight waxes. The catalyst, a promoted iron catalyst, is formed by reduction of a comminuted fused mixture of Fe_3O_4, 0.05 to 1.0 wt. % K_2O, 1 to 2 wt. % Al_2O_3 and 1 to 10 wt. % CaO. D. A. Dirksen

Hodges, L. P. (assigned to Standard Oil Development Co.) SEPARATION OF OXYGENATED ORGANIC COMPOUNDS FROM SYNTHETIC NAPHTHA. U.S. 2,584,269 (1952) February 5.

The patent claims a method of removing oxygenated organic compounds from a synthetic naphtha by admixing the naphtha with a treating agent which is composed of an alkali-metal naphthenate (sodium naphthenate) an alkali-metal hydroxide (sodium hydroxide), and a hydrocarbon boiling in the lubricating-oil range (above 600°F.). H. A. Dirksen

Schultz, J. F., Seligman, B., Shaw, L., and Anderson, R. B. EFFECT OF NITRIDING ON THREE TYPES OF IRON CATALYSTS. *Ind. Eng. Chem.* 43, 397-401 (1952) February.

Results of studies of nitrided catalysts are presented for tests of fused magnetic, aluminum oxide, potassium oxide and iron catalysts of precipitated and sintered types. The nitrided catalysts were found to be more active, to have a longer life and to be more stable than the reduced catalysts. H. A. Dirksen

Fluidized Selective Synthesis

Sullivan, F. W., Jr. (assigned to Hydrocarbon Research, Inc.) METHOD FOR THE SYNTHESIS OF HYDROCARBONS IN THE PRESENCE OF A SOLID ABSORBENT. U.S. 2,583,611 (1952) January 29.

This patent claims an improvement in fluidized crackers in that a less dense material than the catalyst is introduced with the synthesis gas to adsorb the liquid hydrocarbons and permit more selectivity in products and less catalytic absorption from the carbon monoxide-hydrogen synthesis reaction. The adsorbent material i.e. activated charcoal, is removed with the effluent gases and stripped in a separate recovery process. H. A. Dirksen

Oil Supply

Ralph, H. D. PLENTY OF OIL. *Oil Gas J.* 50, 45-46 (1952) March 3.

Natural Petroleum Council's Oil and Gas Availability Committee has issued a 100 page report in which it is stated that there will be plenty of oil for the next 50 years if incentive is left to produce it. The world outlook is declared to be even more promising than that for the United States. J. D. Parent

Production

Grossman, W. L. HYDRAFRAC—THE SPRABERRY STIMULANT. *Petroleum Eng.* 24, B36-B40 (1952) February.

The Hydrafrac process involves extending old fractures and making new ones in reservoir rock. Sand of about 0.02 inch diameter is suspended in a viscous fluid composed of kerosene and an oil-soluble soap, and this mixture is pumped into the cracks. About ½ lb. of sand per gallon is used. The fluid flows out in a day's time, but a thinning agent is usually added for insurance; this is pumped in with crude oil. Data on the manner of using the Hydrafrac process at Spraberry is given. Most of the oil in this field is in sandstone.

J. D. Parent

Shale Oil

Sherwood, P. W. SHALE OIL PRODUCTION AND REFINING TODAY. PART I. *Petroleum Refiner* 31, 97-101 (1952) February.

The article discusses the petroleum demand and the possible source in oil shale. The occurrence

of oil shale throughout the world and the work being done on it are mentioned and some figures given. The proportion of oil shale and the operating variables in retorting tend to offer the picture that liquid hydrocarbons from this source is quite probable in the near future.

H. A. Dirksen

Synthesis Gas

Clark, A. (assigned to Phillips Petroleum Co.) CONTROL OF CATALYST CONCENTRATION. U.S. 2,583,255 (1952) January 22.

A process is claimed where hydrogen and carbon monoxide in the molal ratio of 1:1 to 3:1 is synthesized in a fluidized bed and the effluent gas to fresh gas ranging between 1:1 and 8:1 volume-ratio is recycled to maintain a constant density of suspended catalyst in the reaction zone.

H. A. Dirksen

Watson, C. W. (assigned to The Texas Company) PRODUCTION OF LIQUID HYDROCARBONS, OXYGENATED HYDROCARBONS AND THE LIKE. U.S. 2,583,164 (1952) January 22.

A method is given which comprises generating a synthesis gas by contacting a carbonaceous feed with a reducible Fe_3O_4 metal oxide at an elevated temperature (1000-2000°F.) such that the metal oxide is reduced and a synthesis gas is formed. Thereafter the synthesis gas is contacted with the reduced catalyst and an oxidizing agent in a synthesis zone at a suitable temperature (350°-500°F.) to produce desired fractions of hydrocarbons and oxygenated hydrocarbons. The then oxidized catalyst is returned again to generate a synthesis gas.

H. A. Dirksen

Synthetic Ammonia

Shearon, W. H., Jr. and Thompson, H. L. AMMONIA AT 1000 ATMOSPHERES. *Ind. Eng. Chem.* 43, 254-264 (1952) February.

The article gives in detail the formation of an ammonia fertilizer corporation, the construction and operation of a plant and distribution of the finished product. Of special interest is the description of hydrogen production from natural gas and modern ammonia synthesis as practiced at Yazoo City, Miss. and throughout the nation.

H. A. Dirksen

7. ANALYTICAL METHODS AND TESTS

Air Analysis

Mullen, P. W. RAPID VOLUME AND CONCENTRATION CALCULATIONS IN INDUSTRIAL AIR ANALYSIS. SLIDE RULE TECHNIQUE. *Anal. Chem.* 23, 417-420 (1952) February.

A slide rule is described for correcting gas volumes to standard temperatures and pressures with an accuracy of within 1%. The design may be altered to permit the calculation of the concentration of air contaminants from the volume of standard reagent required for their titration.

C. E. Hummel

White, W. C. (assigned to General Electric Co.) METHOD AND APPARATUS FOR THE QUANTITIATIVE MEASUREMENT OF IMPURITIES IN AN ATMOSPHERE. U.S. 2,579,352 (1951) December 18.

A description is given of a device which detects impurities in air by means of measuring the change in discharge current between two electrodes immersed in the contaminated air. The method of measurement consists of alternately passing pure air and contaminated air between the electrodes and measuring the differences in discharge current on a standard recording ammeter.

D. V. Kniebes

Automatic Sampler

Bourne, H. G., Jr. CONSTRUCTION OF AN AUTOMATIC AIR SAMPLING APPARATUS. *Heating & Ventilating* 49, 65-68 (1952) January.

An apparatus is described which permits the automatic collection of composite air samples for dust counting. By utilizing a midget impinger-flask and nozzle, 0.0312 cu. ft. of air is taken every 15 minutes for a period of 8 hours or more. Sample volumes vary by about 0.8%. The automatic siphon sampling device can be operated from water lines or by a pump.

C. E. Hummel

Flue Gas Sulfur

Corbett, P. F. and Crane, W. M. (Review series No. 111) DETERMINATION OF SO_2 AND

SO_3 IN FLUE GASES. *British Coal Utiliation Research Assoc. Monthly Bull.* **16**, 1-10 (1952) January.

Chemical and physical methods are described for the determination of SO_2 and SO_3 in flue gases. The problems incurred in the accurate sampling and absorption of gases containing SO_3 are discussed. An extensive bibliography is included. C. E. Hummel

Gas Analyzer

Cotton, P. E. (assigned to Factory Mutual Research Corp.) GAS ANALYZER AND SMOKE DETECTOR. U.S. 2,583,930 (1952) January 29.

This gas detector consists of two resistance elements connected in a Wheatstone bridge. The elements are identical except that the core of one is impregnated with a platinum or platinum-rhodium catalyst. This arrangement causes one element to be more active than the other in the presence of a flammable component.
C. E. Hummel

Hazeltine, L. S. and Stanfield, L. A. GAS ANALYSIS APPARATUS. U.S. 2,585,314 (1952) February 12.

A simple portable apparatus is described for use by unskilled personnel in determining if products of combustion are present in hot air ducts. A measured volume of the gas to be tested is bubbled through a known amount of standard strontium hydroxide solution containing phenolphthalein. The presence of carbon dioxide in the gas sample sufficient to cause coloration of the absorbent indicates a leak of combustion products into the system.
C. E. Hummel

H_2S Determination

Dunicz, B. L. and Rosenquist, T. DETERMINATION OF MICROGRAM QUANTITIES OF SULFIDE SULFUR. *Anal. Chem.* **23**, 404-406 (1952) February.

Small amounts of hydrogen sulfide or sulfides than can be converted into hydrogen sulfide are determined by quantitative oxidation of sulfide into sulfate, using hypochlorite solutions at a controlled pH. The advantage of this method over iodine titrations is that it utilizes an exchange of 8 electrons per atom of sulfur.
C. E. Hummel

Spectroscopic Analysis

Broida, H. P. and Moyer, J. W. SPECTROSCOPIC ANALYSIS OF DEUTERIUM IN HYDROGEN-DEUTERIUM MIXTURES. *J. Optical Soc. Am.* **42**, 37-41 (1952) January.

Gaseous mixtures of hydrogen and deuterium from 85 to 100 percent deuterium have been rapidly analyzed spectroscopically to within 0.1 percent of the major component. A 150-megacycle electrodeless discharge in flowing gas has been used. Under typical conditions the value of the measured intensity ratio was found to vary with pressure in an unexplained manner. The addition of air up to 2.5 percent has not affected the measured isotope ratio.
Authors' Abstract

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Centofanti, O. GAS LEAK DETECTOR, p. 83
Randall, H. M. HOW TO IDENTIFY CHROME STEELS QUICKLY. p. 84

8. GENERAL AND PHYSICAL CHEMISTRY

Azeotrope Separation

Schwertz, F. A. (assigned to Koppers Company, Inc.) DIFFUSION. U.S. 2,583,601 (1952) January 29.

The application of porous-boundary diffusion to separation of azeotropic mixtures is described, with special reference to water-pyridine mixtures. O. P. Brysch

Catalytic Gas Separatian

Rosenblatt, E. F. (assigned to Baker & Co., Inc.) METHOD OF REMOVING FREE OXYGEN OR FREE HYDROGEN FROM A GASEOUS MEDIUM. U.S. 2,582,885 (1952) January 15.

Free oxygen or hydrogen are removed from a gas at room temperature in a flameless combustion using a catalyst of palladium deposited on aluminum oxide or zirconium dioxide. The oxygen content of a hydrogen stream containing 0.1% oxygen was reduced to one part in ten million. The extraction of nitrogen from air by catalytically combining the oxygen present with added hydrogen is also covered by this patent.
C. E. Hummel

Flame Research

Bundy, F. P., and Strong, H. M. (assigned to General Electric Co.) APPARATUS FOR MEASURING GAS VELOCITY IN FLAMES. U.S. 2,578,398 (1951) December 11.

A device is described for measuring gas velocities in high temperature, high speed flames such as rocket motor exhausts. Use is made of the Doppler principle by determining slight differences in the wavelength of light emitted by the flame, depending upon whether the light observed travels upstream or downstream with respect to the gas velocity in the flame.

E. F. Searight

Manton, J., von Elbe, G., and Lewis, B. NONISOTROPIC PROPAGATION OF COMBUSTION WAVES IN EXPLOSIVE GAS MIXTURES AND THE DEVELOPMENT OF CELLULAR FLAMES. *J. Chem. Physics* **20**, 153-157 (1952) January.

The hydrodynamics and the diffusion theories for nonisotropic propagation of combustion waves and for the development of cellular flames are discussed. The hydrodynamic theory does not appear to explain the phenomenon satisfactorily, but the diffusion theory is applicable to the data presented. It is noted that nonisotropic propagation takes place in all cases of non-stoichiometric mixtures in which the component of lower diffusivity is present in excess, while isotropic propagation takes place in stoichiometric mixtures, and in mixtures in which the component of higher diffusivity is present in excess. E. F. Searight

Gas-Condensate Equilibria

Sage, B. H., and Reamer, H. H. VOLUMETRIC BEHAVIOR OF CONDENSATE AND GAS FROM A LOUISIANA FIELD.—II. *J. Petroleum Techn.* **4**, 11-14 (1952) January.

The formation volume and the relative volume of the liquid phase of mixtures of condensate and gas from five different parts of a field in the Louisiana area have been established experimentally. These studies included gas-condensate ratios as high as 25,000 cu ft/bbl at pressures up to 5,000 psi. The gravities of the tank condensates were between 53.9° and 63.9° API. The compositions of the condensate and gas samples investigated are presented in tabular form. The formation volume, the relative volume of the liquid phase, and the specific volume of the mixtures are available. A rough correlation of the formation volume as a function of pressure, temperature, and gas-condensate ratio has been presented. This correlation is considered applicable only to the range of conditions covered in this investigation for systems of similar nature and composition. Authors' Abstract

Gaseous Diffusion

Bowman, J. R. and Cichelli, M. T., (assigned to Gulf Research & Development Co.) PROCESS AND APPARATUS FOR SEPARATION OF MIXTURES. U.S. 2,584,785 (1952) February 5.

A new process and apparatus for the separation of gaseous mixtures is described. The process is based on the principle of "Sweep Diffusion". A gaseous mixture to be separated is allowed to diffuse through a streamlined flow of vapor which could be separated from the gaseous mixture by any physical or chemical means. The component of the gas mixture which is more diffusible in the vapor is swept with the vapor and collected at one end while the less diffusible component is collected at the other end. Generally process or waste steam could be used as actuating vapor and separated by condensing with cold water. It is important to avoid turbulence and channeling of the gas flow in order to obtain good separation. Diagrams of different types of apparatus to achieve this end are well illustrated. D. C. Gami

Robb, W. L. and Drickamer, H. G. DIFFUSION IN CO_2 UP TO 150 ATMOSPHERES PRESSURE. *J. Chem. Physics* **19**, 1504-1508 (1951) December.

Diffusion coefficients have been obtained for the system CO_2 — $C^{14}O_2$ up to 150 atmospheres pressure and from 0° — 45°C. The coefficients are consistent with theory up to a density of 0.067 g/cc. In the range from 0.067 – 0.70 g/cc, the coefficients are higher than predicted by theory. At densities above 0.65 g/cc. no measureable temperature coefficient of D was obtained. N. L. Carr

Wahlin, H. B. THE TRANSMISSION OF HYDROGEN THROUGH METALS. *J. Applied Phys.* 22, 1503 (1951) December.

Hydrogen was found to pass through a palladium metal tube which was made the cathode in an ordinary sulfuric acid bath. As much as 1.5 c.c./cm²/min. of gas was transmitted at room temperature, and a pressure of 700 psi. was built up. This was not the limiting pressure which would probably be several thousand pounds. Slight transmission was also found with Ni, Nb, Ta, Mo and Fe tubes.

D. V. Kniebes

Gas Temperature Gradients

Corcoran, W. H., Page, F., Jr., Schlinger, W. G., and Sage, B. H. TEMPERATURE GRADIENTS IN TURBULENT GAS STREAMS. METHODS AND APPARATUS FOR FLOW BETWEEN PARALLEL PLATES. *Ind. Eng. Chem.* 44, 410-419 (1952) February.

Process design finds increasing need for information concerning the distribution of temperature and thermal flux in turbulent streams. The present program of investigation was initiated to supplement available microscopic data for thermal transfer in turbulent air streams. Equipment is described for the measurement of thermal flux, temperature, and velocity as a function of position in a turbulent, steady, nearly uniform air stream. Velocities up to 100 feet per second may be investigated under transverse thermal gradients as high as 1200°F. per foot. Effort has been directed to the precise measurement of the primary variables in order that point values of eddy conductivity may be obtained and the conditions of flow established. Typical results relating to the conditions of flow under isothermal conditions are reported. The experimental background necessary to permit the prediction of temperature and thermal flux under the conditions of flow encountered in industrial practice is of practical engineering interest. The equipment described will permit the establishment of point values of eddy conductivity in a turbulently flowing air stream at Reynolds numbers up to 60,000 under conditions of nearly two-dimensional uniform flow. Such microscopic data supplement information presently available concerning the thermal transfer in turbulent air streams. The flow conditions in this equipment are similar to those predicted from existing generalizations of isothermal, steady, uniform flow between parallel plates. The results obtained are directly applicable only to such conditions and may not be indicative of the nature of turbulent flow within circular conduits.

Authors' Abstract

High Temperature Arcs

Rudorff, D. W. HIGH-TEMPERATURE ARCS. *Eng. Digest* 13, 6-8 (1952) January.

Methods of obtaining high-temperature arcs are described, particularly that of H. Gerdien and A. Lotz. An improved water-arc technique is described where temperatures of 50,000° K were obtained.

D. V. Kniebes

Hydrocarbon Adsorption

Koble, R. A. and Corrigan, T. E. ADSORPTION ISOTHERMS FOR PURE HYDROCARBONS. *Ind. Eng. Chem.* 44, 383-387 (1952) February.

A new equation to correlate adsorption isotherms is derived. Experimental data on methane, ethane, propane, ethylene and propylene are plotted according to this equation. The chief advantage of this equation is that its constants are independent of temperature.

D. C. Gami

PVT Relationships

Bennett, C. O. and Dodge, B. J. COMPRESSIBILITIES OF MIXTURES OF HYDROGEN AND NITROGEN ABOVE 1000 ATMOSPHERES. *Ind. Eng. Chem.* 44, 180-185 (1952) January.

The P-V-T equations of hydrogen-nitrogen mixtures from 1000 to 3000 atmospheres in the temperature range from 20° to 120° C. are studied. It was found that within this range the experimental data obeyed Amagat's law with an accuracy of 0.2%.

D. C. Gami

Reamer, H. H., Selleck, F. T., Sage, B. H. and Lacey, W. N. PHASE EQUILIBRIA IN HYDROCARBON SYSTEMS. *Ind. Eng. Chem.* 44, 198-201 (1952) January.

The P-V-T relationship of the nitrogen-ethane system for 3 mixtures of nitrogen and ethane for a temperature range of 40° F. to 480° F.

and pressures up to 10,000 psi has been investigated. The experimental data could be obtained by writing to American Documentation Institute for Document No. 3265 Washington, D.C. 1951. D. C. Gami

Van Winkle, M. EQUILIBRIUM CONSTANTS OF THE HEAVIER HYDROCARBONS AT SUBATMOSPHERIC PRESSURE. *Petroleum Refiner* 31, 111-116 (1952) February.

New experimental work has been done on vapor-liquid phase equilibria in systems containing dodecane, tetradecane, hexadecene, and octadecene. Experimental data on binary mixtures containing these compounds were used to develop K charts for each component covering the range 10 to 1000 mm. Hg absolute, and 100° to 700° F. Within the region of experimental data the charts in some instances show deviations up to 5 percent from the experimental values because of the characteristics of the individual mixtures.

Author's Abstract

Schlieren Photography

Adams, G. K. A REPETITIVE SPARK SOURCE FOR SHADOW AND SCHLIEREN PHOTOGRAPHY. *J. Sci. Instruments* (British) 28, 379-384 (1951) December.

Two methods of producing sparks of high brightness and short duration at high repetition frequencies are described. The circuits used are simplified versions of standard radar techniques and moderate voltages (5-10 kV), and standard components are used. The first method gives a limited number of discharges (four to eight) at individually determined time intervals of ten microseconds or greater with an error of less than one microsecond, and is intended for the production of superimposed photographs on a stationary film. The second method, used with a rotating drum or mirror camera, gives a greater number of light pulses at preset repetition frequencies up to 10,000 per sec. The energy of each spark is of the order of 1 joule, and the effective photographic duration less than 1 microsec. Adequate negative densities are obtained on process-type emulsions at distances not greater than 1 metre. The elementary principles underlying the methods are briefly discussed and suggestions are made for increasing the flash energy and repetition frequency.

Author's Abstract

Silica-Alumina Gels

Hauser, E. A. and Le Beau, D. S. THE SURFACE STRUCTURE AND PROPERTIES OF COLLOIDAL SILICA AND ALUMINA. *J. Phys. Chem.* 56, 136-139 (1952) January.

Systematic studies of different synthetic silica gels, silicic acid gel, alumina-silica gel and magnesia-silica gels by differential thermal analysis and X-ray diffraction have offered definite proof that these products are amorphous in structure. W. J. Pleticka

Synthetic Ammonia Catalysts

Kummer, J. T. and Emmett, P. H. HYDROGEN EXCHANGE REACTIONS OVER IRON SYNTHETIC AMMONIA CATALYSTS AT −195°. *J. Phys. Chem.* 56, 258-261 (1952) February.

The behavior of singly promoted and doubly promoted iron catalysts has been compared for the ortho-para hydrogen interconversion and for the hydrogen-deuterium exchange reaction at −195°. The work of Emmett and Harkness on the ortho-para conversion over the doubly promoted catalyst has been confirmed by showing that the ortho-para exchange occurs rapidly on such a catalyst at −195° but is very strongly poisoned by the presence of hydrogen chemisorbed at or about 100°. The hydrogen-deuterium exchange over the doubly promoted catalyst has been found to be very slow at −195°. Singly promoted iron catalysts, unlike the doubly promoted catalysts, rapidly catalyze the hydrogen-deuterium exchange at − 195° as well as the ortho-para hydrogen conversion. Furthermore, the latter reaction is not poisoned by hydrogen put on the catalyst at 100°. The existence of a third type of activated adsorption of hydrogen on a singly promoted catalyst is suggested by the high velocity for the H_2-D_2 exchange and by the appearance of the low-temperature adsorption isotherms and the adsorption isobar. Authors' Abstract

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Broida, H. P. SPECTROSCOPIC ANALYSES OF DEUTERIUM IN HYDROGEN-DEUTERIUM MIXTURES. p. 76

Gorin, E. INTEGRATED GASIFICATION ELECTRO-CHEMICAL SYSTEM. p. 67

9. ORGANIC CHEMISTRY

Acetylene from Propane

Dutcher, H. A. (assigned to Phillips Petroleum Co.) PROCESS FOR THE PRODUCTION OF ACETYLENE. U.S. 2,582,016 (1952) January 8.

An improved pebble heater design is described in which 4 vertically superposed chambers are utilized. The process is specifically designed for production of acetylene, or a low gravity gas, from propane. The inventor claims improved heat transfer and greatly improved process flexibility. W. G. Bair

Cyclopentadiene

Businger, R. T. and Gerhart, H. L. (assigned to Pittsburgh Plate Glass Company) HIGH PURITY DICYCLOPENTADIENE. U. S. 2,582,920 (1952) January 15.

High-purity dicyclopentadiene is produced from a cracked product stock containing it and higher-boiling impurities (styrene, indene), by preheating the stock to 300°-400° F, as a continuous liquid stream, flashing this to vapor in a cracking zone at 400°-800° F., withdrawing the cyclopentadiene vapors and liquid impurities and cooling to 100°-200° F. The impurities are separated and the vapors are condensed and dimerized by storing at 200° F.

O. P. Brysch

Hydrocarbon Separation

Linn, C. B. (assigned to Universal Oil Products Co.) PROCESS FOR SEPARATION OF HYDROCARBONS. U.S. 2,582,443 (1952) January 15.

Liquid paraffinic hydrocarbon solvents selectively absorb saturated hydrocarbons containing 2 to 4 carbon atoms from a mixture of saturated and unsaturated aliphatic hydrocarbons. This invention takes advantage of this fact and proposes to separate acetylene from a mixture of acetylene and ethane by using n-butane or n-pentane as solvent. The working temperature should be below the critical temperature of the solvent (to keep it in liquid phase) and a pressure of at least 10 atmosphere should be utilized. This process could be extended for the separation and purification of other hydrocarbons. D. C. Gami

Polymerizing Catalyst

Bailey, G. C. and Reid, J. A. (assigned to Phillips Petroleum Company) SiO_2-Al_2O_3-NiO CATALYST AND ITS PREPARATION. U.S. 2,581,228 (1952) January 1.

A process for preparing a catalyst suitable for polymerization of olefins is claimed. The catalyst consists of 0.1 to 5% nickel and alumina in the range of 1 to 10% on silica gel.

W. J. Pleticka

10. CHEMICAL ENGINEERING

Air Drying

DRYING AIR IN A FIXED BED: CAN CALCULATIONS BE MADE? *Chem. Eng.* **59**, 322-326 (1952) January.

A rate mechanism for drying air in a packed column of a constant bed height has been studied. After careful consideration of the experimental data, it was concluded that mass transfer controlled. An equation correlating the Kg S with the mass velocity G is used, and a sample calculation showing the required time for air of a given mass velocity and humidity to be dried to a partial pressure of H_2O of 0.328 mm Hg is presented. S. Mori

Cyclone Design

Stairmand, C. J. DESIGN AND PERFORMANCE OF CYCLONE SEPARATORS. *Internat. Chem. Eng. and Process Ind.* (British) **33**, 89-91 (1952) February.

The basic principles of theory of operation, design and performance of cylones are presented.

It is pointed out that theoretical considerations are not entirely useful in predicting performance efficiency because of the influence of such factors as eddying, particle bouncing and particle aggregation, therefore practical tests must be made. The type of cyclones best adapted for fine dusts, coarse dusts, sticky dusts, and for restricted space and headroom are given. A well designed cyclone should have a smooth, circular body, with an inlet which will introduce the gas with a minimum of disturbance to the spinning vortex in the body of the cyclone. The exit pipe should be axially located and of small diameter compared to the body. The dust discharge should be preferably of the "long-cone" design. E. J. Pyrcioch

Fluid Flow

Partridge, F. M. FUNDAMENTALS OF ORIFICE MEASUREMENT. *Instruments* 25, 207-209 (1952) February.

Fundamentals of orifice measurement are discussed and well illustrated by diagrams.

D. C. Gami

Fluidized Contactor

Scheeline, H. W. (assigned to Standard Oil Development Co.) PROCESS FOR COUNTERCURRENT CONTACTING OF SOLIDS AND GASES. U.S. 2,584,296 (1952) February 5.

The patent describes a solid-gas contactor such as an absorber or catalytic reformer. It is comprised of a long vertically disposed cylindrical shell with heat exchange sections in either end and a center section for the reaction zone. The solid material moves downward countercurrent to the gas phase. The design is such that the two heat-exchanger sections have turbulent flow patterns which allow for good heat exchange coefficients, while the reaction zone has nonturbulent flow which allows for excellent gas-solid contact and consequent high absorption coefficients. The process is specifically applied to absorption of the C_2 fraction from cracked gas by activated charcoal. W. G. Bair

Gas Absorption Review

Pigford, R. L. ABSORPTION AND HUMIDIFICATION. *Ind. Eng. Chem.* 44, 25-30 (1952) January.

Published work during the past year has included several important papers on industrial sulfur recovery processes: Development of absorption processes used at Trail, B. C., for removing sulfur dioxide from smelter gases; a commercial process for producing liquid sulfur dioxide from smelter gas; and another for the removal of hydrogen sulfide from manufactured gases are described. British and American papers on diffusion theory and its applications continue to appear at the usual frequency and have been added to by several interesting contributions from Japan. New data on the performance of tray columns, packed columns, and spray towers were reported, and two processes for separating gases by differential diffusion rates through a condensable vapor were described and analyzed. Author's Abstract

Heat Transfer

West, F. B. and Taylor, A. T. THE EFFECT OF PULSATIONS ON HEAT TRANSFER. TURBULENT FLOW OF WATER INSIDE TUBES. *Chem. Eng. Progress* 48, 39-43 (1952) January.

Water-film heat transfer coefficients for heating and cooling at Reynolds numbers between 30,000 and 85,000 were increased as much as 60 to 70% over predicted values by the use of partially dampened pulsating flow from a reciprocating pump. This method appears to be applicable in increasing the capacity of existing heat exchangers. However, the power consumption for pumping may increase as much as 30%.

C. von Fredersdorff

Height of Stacks

Steinbock, R. S. STACKS FOR POLUTION CONTROL.—I. *Chem. Eng.* 59, 202-206, (1952) February.

Stack heights are estimated by the Bosanquet and Pearson equation for ground concentration of pollutants, which may be written

$$C = \frac{(9.4 \times 10^6) M e^{-2H^2/X}}{VX^2}$$

where C denotes ground concentration in ppm.
H is the effective stack height, ft.
X is the distance from the stack, ft.
M is the emission rate of pollutants, tons/day.
and V is the wind velocity, mph.

C. von Fredersdorff

Packing Glands

Ellis, L. T., Jr. and Fussell, C. L. MECHANICAL SEAL RETAINING ASSEMBLIES. *Petroleum Eng.* 24, C20-C24 (1952) February. ruary.

Methods of correcting underdesigned packing glands are discussed. C. von Fredersdorff

Pebble Heater

Ryan, M. A. (assigned to Phillips Petroleum Co.) PEBBLE HEATER. U.S. 2,584,621 (1952) February 5.

This invention relates to an improved type of pebble heater for cracking hydrocarbons, with means for controlling the residence time of the cracked gas and for quenching the gas as it leaves the reactor. E. J. Pyrcioch

Piping Layouts

Andrews, L. C. PIPING FLEXIBILITY ANALYSIS BY MODEL TEST. *Trans. Am. Soc. Mech. Eng.* 74, 123-133 (1952) January.

The mathematical analyses of piping flexibility require increasingly more time per point of restraint as the complexity of the problems increase. The model study requires less time per point as the complexity increases. The apparatus and the manner in which it is used for these studies are discussel. B. E. Hunt

Sublimate Condensation

Patterson, J. A. (assigned to Standard Oil Development Company) CONDENSATION OF SUBLIMABLE MATERIAL. U.S. 2,583,013 (1952) January 22.

A method for recovering from a vapor stream a contained product which is capable of subliming is proposed, which comprises passing the vapor stream through a cooling zone at a suitable temperature to effect solidification of the product onto added solid particles of the product, separating the vapor and recycling some of the product. An example is phthalic anhydride formed by catalytic oxidation of an aromatic hydrocarbon. H. A. Dirksen

Sulfur Recovery

Kohl, A. L. and Fox, E. D. ECONOMICS OF SULFUR PRODUCTION FROM HYDROGEN SULFIDE. *Oil Gas J.* 50, 154-159, 177 (1952) February 25.

Plant investment and operating cost data are tabulated for five sizes of plants for the conversion of hydrogen sulfide to elemental sulfur by the Mathieson process. These net costs vary from $8.42 per ton to $1.87 per ton for plants capable of producing 20 long tons per day and 320 tons per day, respectively. Sulfur marketing costs are also considered.

C. E. Hummel

Vapor Disposal

Chesler, S. and Jesser, B. W. SOME ASPECTS OF DESIGN AND ECONOMIC PROBLEMS INVOLVED IN SAFE DISPOSAL OF INFLAMMABLE VAPORS FROM SAFETY RELIEF VALVES. *Trans. Am. Soc. Mech. Engrs.* 74, 229-246 (1952) February.

The paper discusses the problems of design for systems when inflammable vapors are to be vented through relief valves. The open versus the closed system is discussed and the questions are presented from which the maximum ground concentration of vapor can be calculated. Therefore the safety of the open systems can be estimated and their applicability decided. If the closed system must be used then there are two methods of decreasing the total cost of the discharge systems. One method is by setting the relief valve pressure under the design pressure of the vessel. This can generally be applied to minimum thickness or low pressure vessels. The other system utilizes newly-developed relief valves that are almost independent of back pressure. Considerable savings are realized by these methods in reducing the size of the discharge lines. W. G. Bair

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Corcoran, W. H. TEMPERATURE GRADIENTS IN TURBULENT GAS STREAMS. p. 78

Shearon, W. J., Jr. AMMONIA AT 1000 ATMOSPHERES. p. 75

11. PROCESS EQUIPMENT AND INSTRUMENTATION

Gas Stream Temperatures

Clark, J. A. and Rohsenow, W. M. A NEW METHOD FOR DETERMINING THE STATIC TEMPERATURE OF HIGH-VELOCITY GAS STREAMS. *Trans. Am. Soc. Mech. Engrs.* 74, 219-228 (1952) February.

A brief review is given of the problem of measuring static temperatures of gases along with a discussion of certain thermo-dynamic methods. A new thermo-dynamic method is then proposed wherein the static temperature of a gas stream is determined from its other properties. The equation for this relationship is derived. The instrument for determining the static pressure, the stagnation pressure and the mass velocity of the gas at the desired point is a water-cooled probe inserted in the gas stream. Although the two other gas properties required are the gas constant and the ratio of the specific heat of the gas which are dependent upon gas composition, the authors show that the effect of both is negligible. Experimental tests were made with the probe, the results indicating that the method is independent of the temperature level and gas composition. The desirable features of the method are: the temperature determined is a point value and not a mean value; the instrument is rugged, corrosion resistant, relatively simple to build and to install.

E. J. Pyrcioch

High Pressure Regulators

Shellshear, W. A. HIGH-PRESSURE GAS REGULATION. *World Oil* 134, 158-160, 162 (1952) February 1.

Various problems and methods of high pressure gas regulation utilizing (1) positive chokes, (2) adjustable chokes, (3) pressure reducing regulators, and (4) combinations of the first three, are discussed. D. C. Gami

Hygrometer

Dember, A. B. (assigned to Bendix Aviation Corp.) DEW POINT MEASURING APPARATUS. U.S. 2,584,988 (1952) February 12.

A new apparatus for measuring or indicating dew point temperatures is described. The controller is the basic element which changes its dimensions according to the relative humidity with a logarithmic extension characteristic. The change in length of the hair element activates a slide wire on the fixed resistance, which changes the voltage of the circuit. This voltage is related in a predetermined manner to the dew point saturation pressure or temperature.

D. C. Gami

Leak Detector

Centofanti, O. (assigned to Socony-Vacuum Oil Company, Inc.) GAS LEAK DETECTOR. U.S. 2,582,859 (1952) January 15.

Gas currents, such as leaks in furnace walls, pass over a heat sensitive resistance in an exploring nozzle and cause unbalancing of a Wheatstone bridge circuit as indicated by a sensitive ammeter or galvanometer.

C. E. Hummel

Page, C. M. FLAMMABLE GAS DETECTOR. U.S. 2,581,812 (1952) January 8.

A portable instrument is described which is capable of detecting leaks in gas mains, etc., and measuring the concentration of flammable gas. The combustion element consists of an electrical heating means in conjunction with a porous catalyst. Most of the combustion takes place at the pores, which avoids the explosions which usually make readings difficult above the lower explosive limit. C. E. Hummel

Pyrometry

Battey, A. J. (assigned to Auburn Spark Plug Co.) HIGH-TEMPERATURE QUICK ACTION THERMOCOUPLE. U.S. 2,581,229 (1952) January 1.

A thermocouple unit is described which is applicable up to 2000° F., and devoid of radiation losses without sacrifice of its response time to sudden changes of temperature of a gas stream. The protecting shield to which a fine-gage thermocouple wire is welded is made of 0.002 to 0.004 inch noble metal to give the unit this fast response time. S. Mori

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Adams, G. K. A REPETITIVE SPARK SOURCE FOR SHADOW AND SCHLIEREN PHOTOGRAPHY. p. 79

Cotton, P. E. GAS ANALYZER AND SMOKE DETECTOR. p. 76

12. MATERIALS OF CONSTRUCTION

Alloy Steels

Randall, H. M. HOW TO IDENTIFY CHROME STEELS QUICKLY. *Petroleum Proc.* 7, 60, 61 (1952) January.

A simple and rapid field test is described for the identification of alloy steels containing between 2 and 12 percent chromium. The three test solutions—various concentrations of HNO_3—are said to permit the determination of the chromium contents in such alloys within $\pm 1\%$. The reactions of these test solutions with various steels are tabulated. B. E. Hunt

Cathodic Protection

Snyder, L. A. EXPERIMENTS IN CATHODIC PROTECTION FOR LARGE STORAGE TANK BOTTOMS. *Gas* 28, 44-45 (1952) February.

Three methods of installing cathodic protection anodes for the protection of large tanks are described. The preferred method involves the placing of the anodes in holes beneath the floor of the tank and approximately one fourth the distance in from the tank wall.

B. E. Hunt

Coatings

Parker, M. E. CORROSION AND ITS CONTROL. PART 46. FIELD TESTS FOR PAINTS. *Oil Gas J.* 50, 161 (1952) February 18.

The selection of test panel size, test rack size, and orientation are described. The importance of representative sampling of both materials and exposures is stressed. B. E. Hunt

Corrosion

Marsden, A. CORROSION — ITS CAUSES AND PREVENTION. PART I. *Ind. Finishing* (British) 4, 515-526 (1952) February.

This article is primarily concerned with an explanation of the various corrosion mechanisms — electrochemical theory and dry corrosion. Various factors which influence corrosion are discussel. B. E. Hunt

Heat Exchanger Corrosion

Dyer, A. R. HOW TO COMBAT HEAT-EXCHANGER CORROSION. *Oil Gas J.* 50, 69-72 (1952) February 4.

The causes and types of corrosion encountered in heat-exchanger tubes in water, steam, and oil service are discussed. The use of new alloys and improved methods of cathodic protection are leading the fight for corrosion prevention.

B. E. Hunt

Insulation

Thomas, R. THERMAL INSULATION FOR INDUSTRIAL REQUIREMENTS. PART II. DESIGN CONSIDERATIONS FOR HIGH TEMPERATURE RANGE INSULATION. *Petroleum Refiner* 31, 117-121 (1952) February.

A brief discussior. on insulators is given as to the requirements demanded by certain specification, such as the thermal conductivity and allowable heat loss of the reactor, type of abrasion or chemicals it is exposed to, various shapes and sizes of equipment it is to insulate and method of supporting the insulation without referring to any specific insulation type.

S. Mori

Pipe Yield Strength

Lodge, J. W., Kirkpatrick, J. W., and Manning, G. K. BIG-INCH LINE PIPE: WHAT IS ITS YIELD STRENGTH? *Oil Gas J.* 50, 142-145 (1952) February 18.

Two API-approved methods for determining the yield strength of steel pipe are currently in use. One, the ring test, gives consistently a higher yield strength at 0.5% elongation than does the other, the flattened-bar test. Since the ring test similates the use conditions for the pipe, the value so obtained should be the proper value to use in design. Explanations are proposed which would explain the discrepancies between the two tests. B. E. Hunt

Plastic Service Piping

PLASTIC TUBING FOUND CONVENIENT AND FLEXIBLE FOR SERVICE PIPING REPLACEMENTS. *Am. Gas J.* 176, 20 (1952) February.

The procedure which Southern Counties Gas Company has adopted for replacing gas services with plastic tubing is described. The tubing — cellulose acetate butyrate — is installed in two sizes, 5/8″ o.d. and 3/4″ o.d. Usual practice consists of running the plastic tubing through the original steel service. B. E. Hunt

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